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Setup and Operation of the TeleEngineering Communications Equipment – Fixed Site (TCE-F), Version III

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Abstract: In fiscal year 1997, the U.S. Army Engineer Research and Development Center initiated a technology demonstration program to determine the feasibility of providing deployed troops with direct access to subject matter experts (SME). Direct access to the SME allows responses to engineering challenges beyond the in-theater capability to be provided without the time delays and costs associated with deploying the SME to the theater.

The purpose of this report is to describe the various components of the fixed-site TeleEngineering communications system and to provide the step-by step procedures required to set up and operate the system. Chapter 2 describes the system components. Chapter 3 provides details on setting up the equipment and the interconnections between the individual components. The operation of the system (i.e., conducting a video teleconference and transferring data) is detailed in Chapter 4, and methods of receiving technical support are discussed in Chapter 5. Appendix A provides a wiring diagram for the fixed-site system; Appendix B summarizes troubleshooting tips.

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Preface

1 Introduction

In fiscal year 1997, the U.S. Army Engineer Research and Development Center (ERDC) initiated a technology demonstration program to determine the feasibility of providing deployed troops with direct access to subject matter experts (SME). Direct access to the SME allows responses to engineering challenges beyond the in-theater capability to be provided without the time delays and costs associated with deploying the SME to the theater.

During the execution of the technology demonstration, the ERDC TeleEngineering Operations Center (TEOC) was established as the main operations center from which TeleEngineering support would be provided to the deployed force. Shortly after the establishment of the TEOC, the U.S. Army Engineer Division, North Atlantic (NAD), requested TeleEngineering support for operations in the Balkans region. In addition to engineer analysis support, the TEOC was requested to develop a method for deployed U.S. Army Corps of Engineers personnel to communicate with the U.S. Army Engineer District, Europe (NAU), NAD, and the TEOC. The requirements for the communications equipment were (a) deployability and (b) the capability to allow secure and nonsecure data transfer, voice, and video teleconferencing (VTC). Additionally, the TEOC was requested to provide TeleEngineering Communications Equipment – Fixed Site (TCE-F) for use by personnel at NAU, NAD, and the TEOC in communicating with deployed personnel. The resulting TCE-F is based on an Integrated Systems Digital Network (ISDN) and is described herein. The deployable, satellite-based system, called TeleEngineering Communications Equipment – Deployable (TCE-D), is described in a separate ERDC report.

The TEOC requested that the ERDC Information Technology Laboratory (ITL) take the lead in developing the communications system. Within a 3-week period, ITL and TEOC personnel researched, designed, procured, validated, and transferred the satellite-based system to NAU for communications with the ISDN-based TCE-F.

The purpose of this report is to describe the various components of the latest version of the TCE-F (Version III) and to provide the step-by-step procedures required to set up and operate the system. Chapter 2 describes the components of the system. Chapter 3 provides details on setting up the

equipment and the interconnections between the individual components. The operation of the system (i.e., conducting a VTC and transferring data) is outlined in Chapter 4. Methods of receiving technical support are described in Chapter 5. Appendix A provides a photo of the POLYCOM VS_x 7000e ports and identifies each; Appendix B provides troubleshooting tips.

2 Components of the TCE-F, Version III

Overview

The basic components of the TCE-F, Version III, are (Figure 1):

a. ADTRAN IMUX (modem).
b. Polycom VS$_x$ 7000e.
c. Personal computer (PC) or laptop.
d. Video display (may vary depending on your office/conference room requirements).
e. KIV-7HSB encryption device.
f. Switchbox with cables.
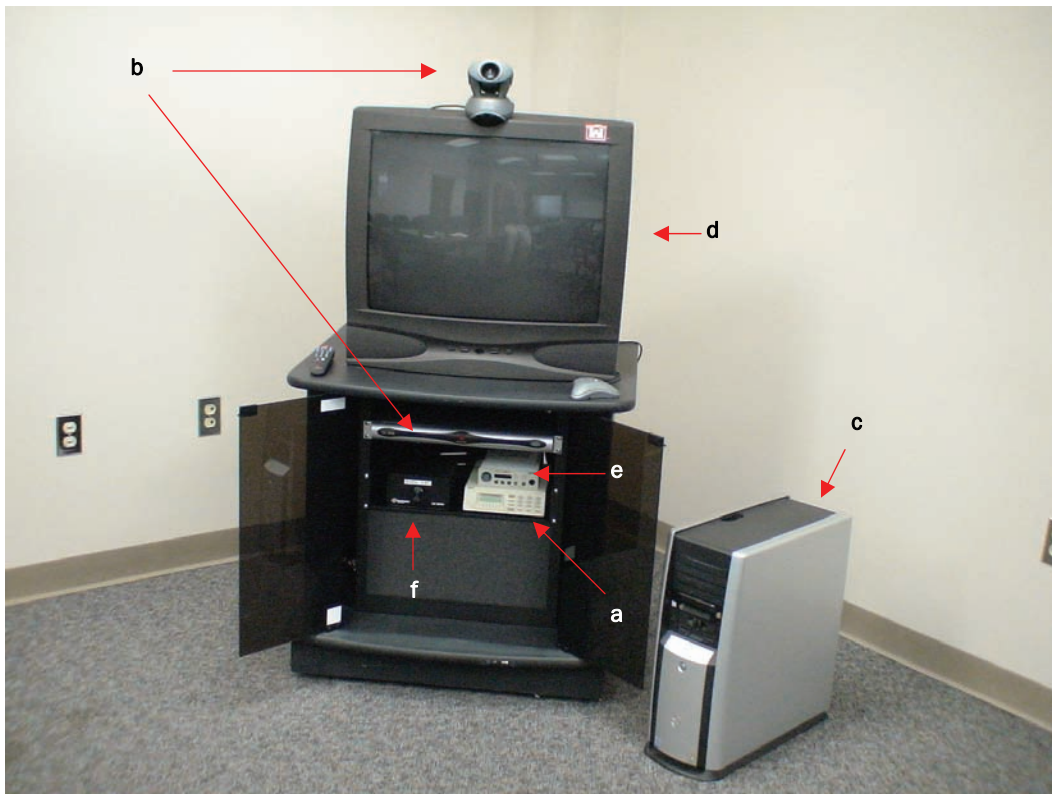
Figure 1. Basic components of the TCE-F, Version III.

Each major component of the TCE-F, Version III (also referred to herein as "TCE-F"), is described in one of the following sections.

ADTRAN IMUX

The basic TCE-F requires a single ISDN line, which is a switched network based on international standards for digital communications supporting voice, data, and video applications. A single ISDN basic rate interface line allows the fixed-site to communicate at rates up to 128 kilobits per second. Faster rates can be obtained by using additional ISDN lines; however, this faster configuration is not discussed in this document. Contact the TEOC for details.

The ADTRAN IMUX (also referred to herein as "ADTRAN" or "IMUX") serves as the dialing interface for the system and, in many cases, also provides the network termination for the ISDN line(s). The specific type of IMUX will vary depending on the type of ISDN line available and the power requirements. A front panel keypad on the ADTRAN supports configuration, test modes, test status, and manual dialing options. Manual dialing is a required feature of the IMUX if the system is to be used with the KIV-7HSB encryption device. See Figure 2 for an illustration of an ADTRAN.

Figure 2. ADTRAN IMUX.

Polycom VS$_x$ 7000e

The Polycom VS$_x$ 7000e (Figure 3) is a versatile video conferencing unit that is interoperable with the KIV-7HSB encryption device and the ADTRAN. The VS$_x$ 7000e included with the equipment uses V.35 protocol, which supports secure communications. The VS$_x$ 7000e has two main parts: the main unit (as shown in Figure 3) and the camera (shown in Figure 4).

Figure 3. Polycom VS$_x$ 7000e.

The VS$_x$ 7000e should be connected to a display device via an S-video jack and standard audio jacks or standard audio/video (A/V) jacks. The plastic housing of the VS$_x$ 7000e camera is designed to rest on top of a television (TV), as shown in Figure 4, or can be shelf-mounted if a flat-screen display or projector is used instead of a TV.

Figure 4. Polycom PowerCam camera resting on a television.

Some cable connections on the rear of the VS$_x$ 7000e main unit are color-coded to ease the task of connecting it to other equipment.

Personal computer

To facilitate secure data communications, a PC is provided with each system. This PC is delivered with two hard disk drives. One hard drive could be used for classified information; the other, for unclassified, for example.

The PC is equipped with a Klashopper digital data communications card (also referred to herein as the "Klashopper") and supporting "Peer-2-Peer" software. It is installed in the PC and operational upon delivery; no further setup is required.

Video display

Standard TV sets, plasma screens, or projectors with RCA or phonojack video and audio inputs are necessary to display the signal received. Larger TVs, projectors, or plasma screens may be more suitable for larger conference areas. For the purpose of this report, it is assumed that a standard TV is being used in the setup.

KIV-7HSB (KIV)

The KIV-7HSB (commonly referred to as the "KIV") is a National Security Agency-certified high-speed encryption device, which enables secure communications. Secure encryption keys must be electronically loaded into the KIV for secure communications. The KIV is produced by Mykotronx and requires a 5 VDC power supply provided with the system.

Switchbox and data cables

All necessary power cables, power strips, etc., are provided with the system. Data cables enabling communications between the ADTRAN, the KIV, and the VS$_x$ 7000e or PC are also provided. A switchbox is provided to facilitate switching the system between VTC mode and data transfer mode.

3   Setup of the TCE-F, Version III

Overview

Subsequent sections describe the steps to set up TCE-F components and to make the correct cable connections between these components. The setup instructions will begin with the ADTRAN. Appendix A provides a diagram identifying the ports on the VS_x 7000e.

ADTRAN

The ADTRAN provided with the continental U.S. systems is typically a 2×64 version and operates on 110 VAC. On the rear of the ADTRAN, there are two data ports, DTE#1 and DTE#2, and an RJ45 ISDN port (as shown in Figure 5). Connect the cable with the 37-pin connector on one end to the DTE#2 port (labeled RS530A/RS232); connect the other end of the cable (25-pin connector) to the KIV (labels are shown in Figure 17). Connect the CAT 5 UTP cable (ISDN network cable) to the ISDN port and the other end of the cable to the commercial ISDN service.
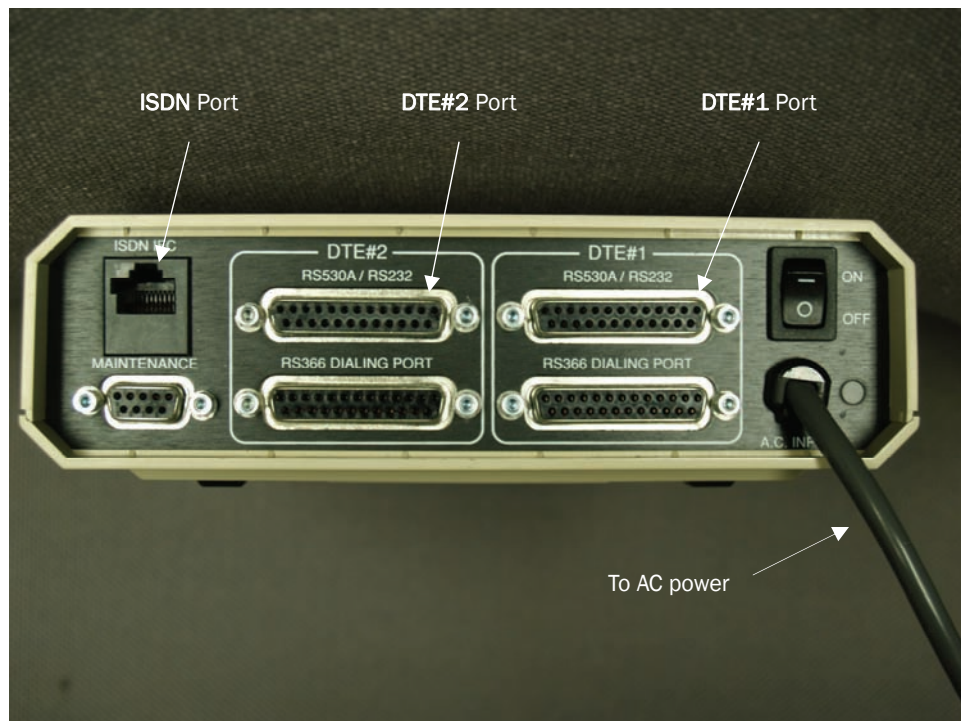
Figure 5. Rear of ADTRAN.

Display device

The TV provided with the fixed-site system is constructed with the required audio and video inputs. The TV connects directly to the VS_x 7000e via the primary A/V cable, shown in Figure 6. The primary A/V cable consists of four smaller cables bundled together. The connectors consist of one semiround yellow S-video connector and three RCA connectors (colored yellow, white, or red).

Figure 6. Primary A/V cable.

TVs provided with the fixed-site systems vary in style, size, and model and are selected based on specific requirements (that is, conference room versus smaller room, power requirements, etc.). Connection of the TV to the VS_x7000e will be discussed in the following section.

VS_x 7000e

Place the VS_x 7000e camera on top of the TV or other suitable location (see Figure 7). Connect the camera at the rear of the VS_x 7000e to the S-video connector designated by the camera 1 icon. On the VS_x 7000e, there are two cable connections for the camera: one controls the pan/tilt/zoom, and the other transmits video.

Figure 7. Polycom PowerCam camera positioned on TV.

Plug each of the connectors on one end of the primary A/V cable into the matching color-coded jacks on the rear of the VS_x 7000e. (The yellow RCA connector is not used.) When viewed from the rear, the three jacks are located to the left of the power cord, and they are identified in a single horizontal row (Figure 8).
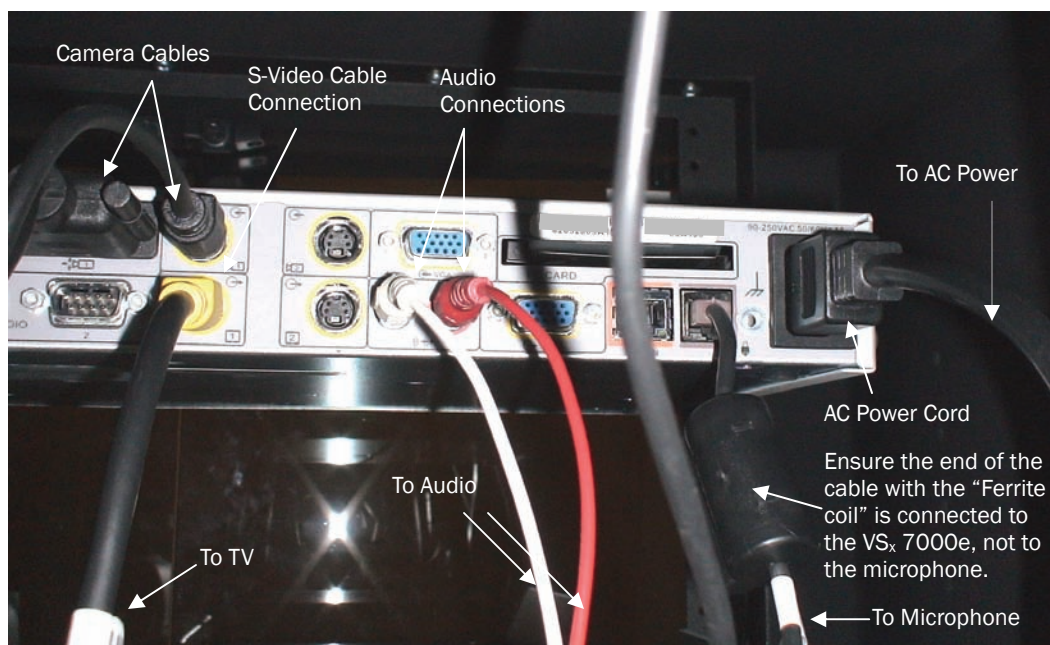
Figure 8. Connection of the primary A/V cable to the VS_x 7000e.

Connect the other end of the cable to the color-coded A/V jacks that are located on the TV, as illustrated in Figure 9. (Note: Location of A/V jacks may vary depending on the TV style and model.) At a minimum, it is only

necessary to connect two plugs. Therefore, yellow S-video plug to yellow S-video jack and white plug to white audio input jack is sufficient. White and red cables are audio cables; you can use these (left and right) for stereo audio as shown in Figure 10.

Attach the AC power cord to the rear of the VS_x 7000e as shown in Figure 10. Plug the other end of the power cord into an AC power outlet.

Figure 9. Connection of the primary A/V cable to the TV.
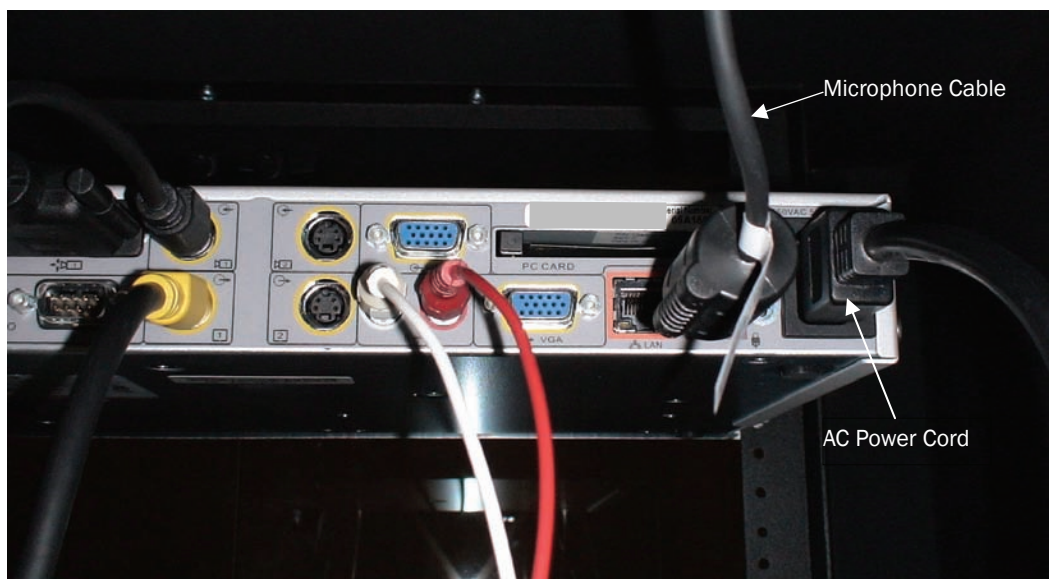
Figure 10. Connection of only two plugs on A/V cable to the VS_x 7000e.

Next, connect the triangular microphone to the VS$_x$ 7000e by inserting the connector (similar to a telephone connector) into the brown jack on the rear of the VS$_x$ 7000e as shown in Figure 11. Connect the other end of the cable to the microphone as shown in Figure 12.
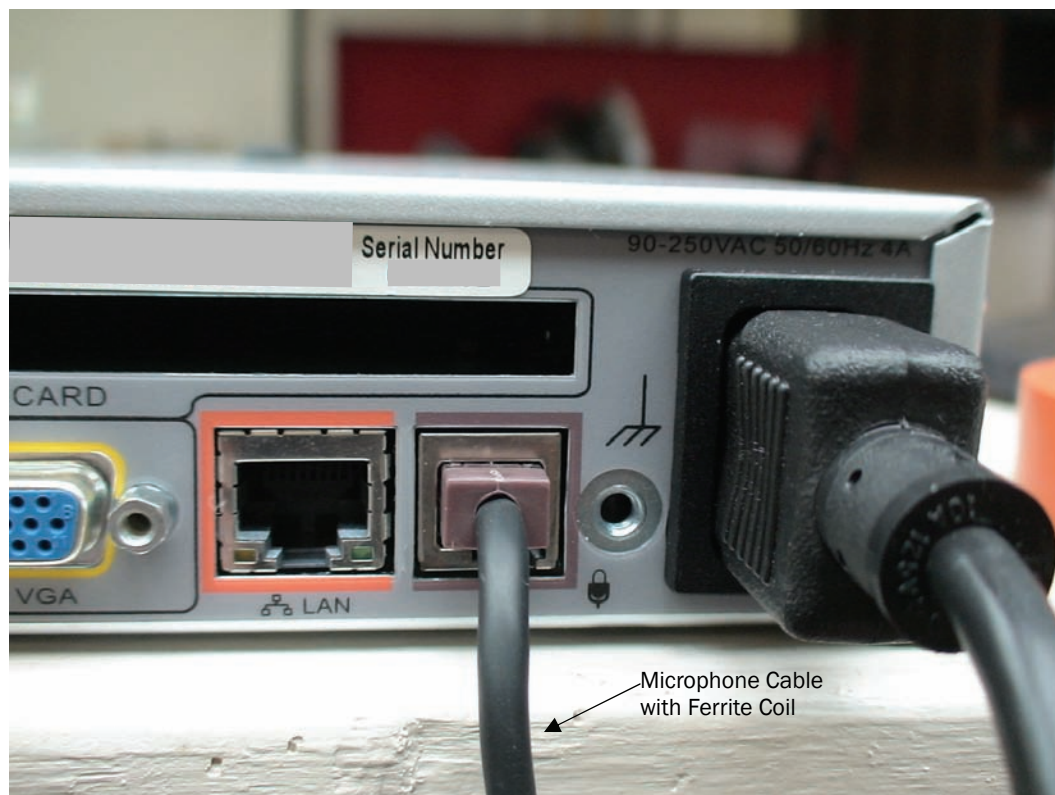
Figure 11. Microphone cable attached to VS$_x$ 7000e.

V.35 to RS-449/RS-530 interface module

The other end of the interface box contains two 25-pin female connectors. The port labeled "1" connects to the "B" port on the switchbox (Figure 13). More details on the switchbox connection are provided later in this chapter. If your system is configured only for VTC, this box will connect directly to the KIV.

Figure 12. Microphone cable attached to microphone.

Figure 13. Connection of the VS$_x$ 7000e rectangular interface box.

Slide projection via VS$_x$ 7000e

PowerPoint® slides may be displayed over the VS$_x$ 7000e by connecting a video cable to the input "VCR/DVD" jack on the left rear of the VS$_x$ 7000e,

and then to the computer (Figure 14). Ensure that a PC containing classified data is not connected during nonsecure VTCs. Likewise, ensure that a PC reserved for only unclassified data is not connected during a secure VTC.
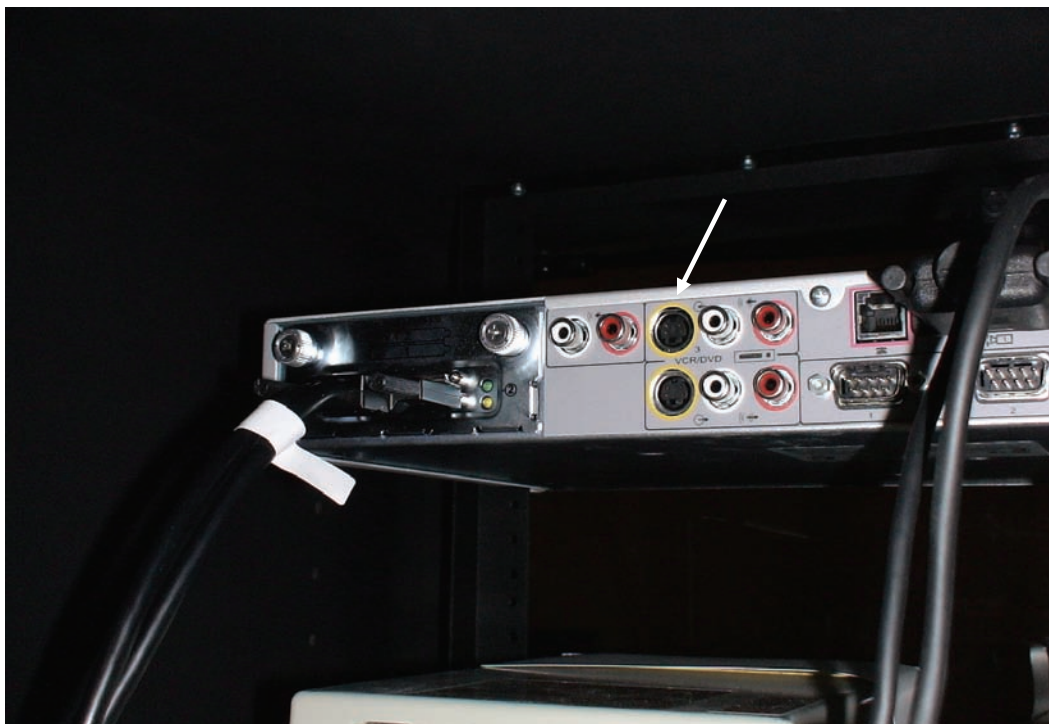
Figure 14. VCR/DVD input jack.

Personal computer

Place the PC on a sturdy, stable surface large enough to accommodate the PC, keyboard, monitor, and mouse. The PC is delivered with two removable hard drives. It is recommended that one of these drives be preserved for UNCLASSIFIED work only; use the other drive for classified work up to the SECRET level.

A Klashopper card is installed in the PC; this card is designed to transmit and receive data in high noise (interference) environments. A cable must be connected from the Klashopper card to the switch box. This cable has a 25-pin connector on one end and a 37-pin connector on the other. Connect the 25-pin end to the Klashopper card port shown in Figure 15.

Figure 15. Klashopper card port on rear of PC.

The other end of the cable must be plugged into port "A" of the switchbox, as illustrated in Figure 16.

The Klashopper card cable actually consists of three cables and two gender changers. One of the cables contains line interface conversion electronics. These cables are delivered connected; however, more details on these connections are provided in the following section.
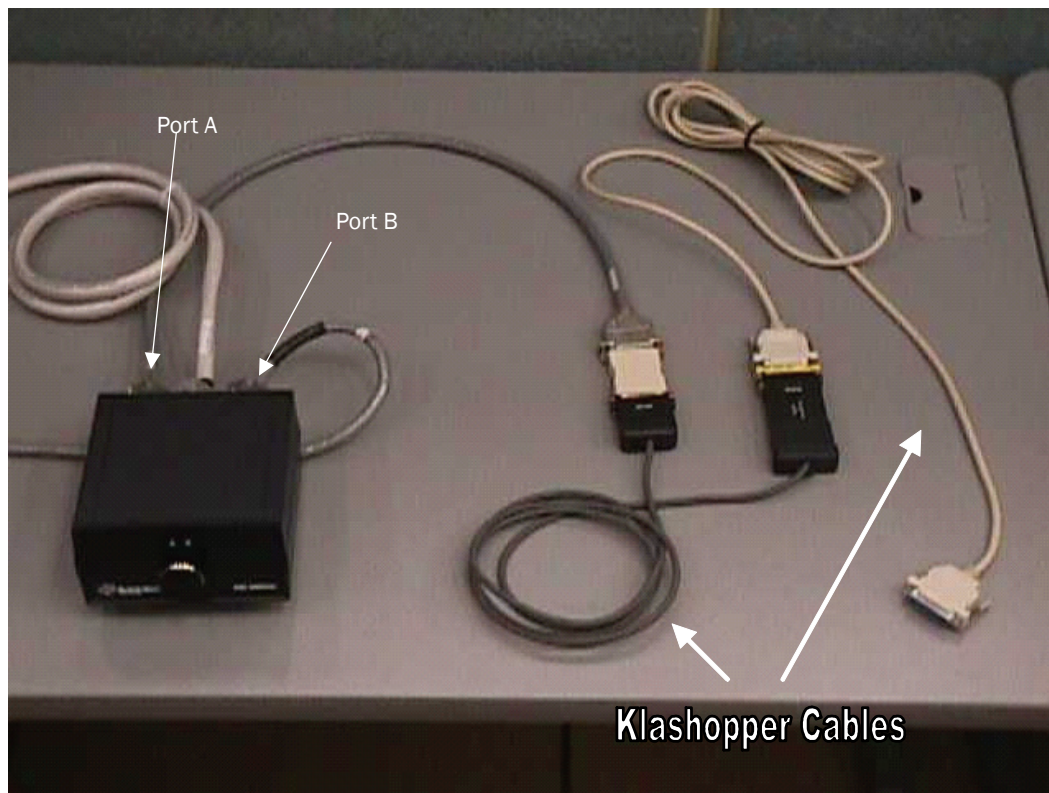
Figure 16. Klashopper cable connection to the switchbox.

KIV, switchbox, cables, and miscellaneous parts

Figure 17 illustrates the KIV, power supply, switchbox, and data cables.

When handling the KIV, be careful not to accidentally "zeroize" the unit. "Zeroizing" the unit deletes all loaded encryption keys, thus rendering the unit useless for secure communications. The KIV can be "zeroized" by simultaneously pressing two buttons (the ZEROIZE and INITIATE buttons) on the front panel. The user should always handle the KIV by the sides of the housing to avoid accidental "zeroizing."
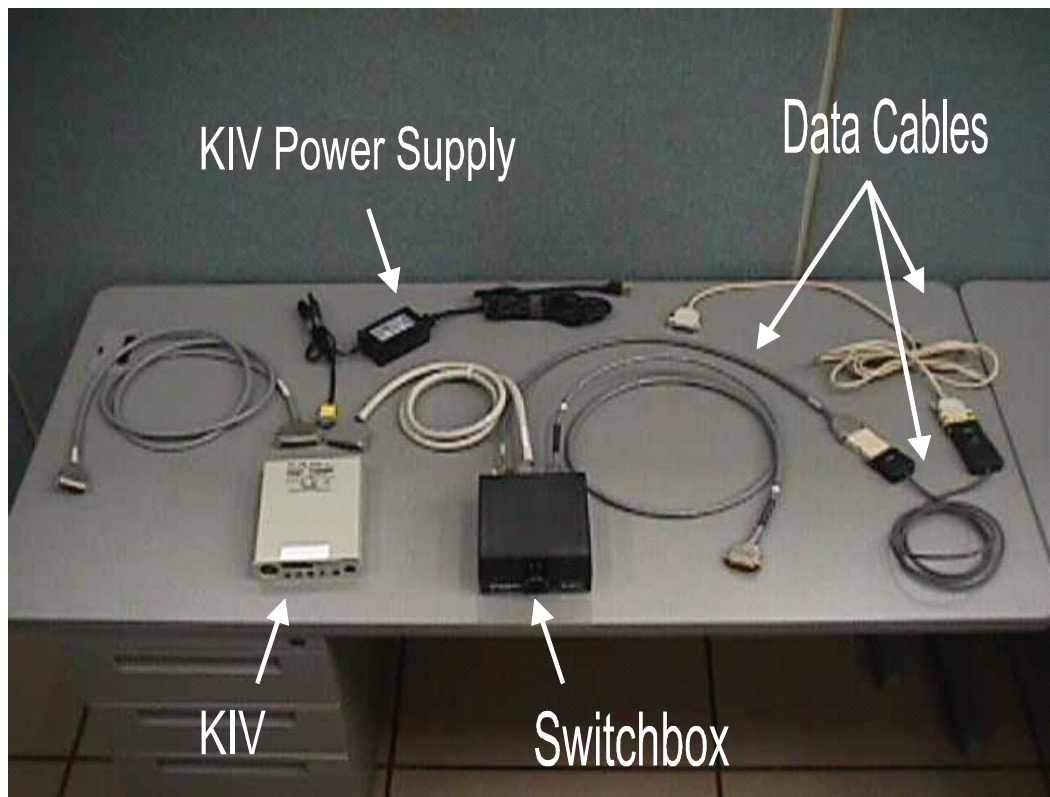
Figure 17. KIV, KIV power supply, switchbox, and data cables.

Four ports are located on the rear of the KIV. Three of the ports are labeled (from left to right) "Red," "Black," and "Power." These ports accept a 37-pin male, a 37-pin female, and a 9-pin female connector, respectively. Connect the KIV power supply to an AC power source. Connect the other end, a 9-pin female connector, into the rear of the KIV at the port labeled "Power," as shown in Figure 18.
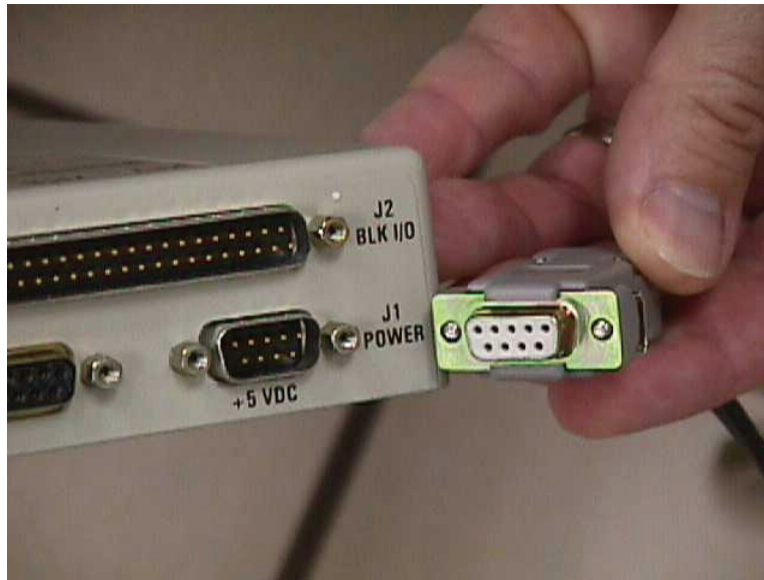
Figure 18. Nine-pin power connection on KIV.

The switchbox is used to select either the "VTC" mode or "Data" commun-ications mode. The switchbox contains a two-position selector knob; the positions are labeled "A" (for data) and "B" (for VTC) (Figure 19).

Figure 19. Front of switchbox.

Three ports are located on the rear of the switchbox. Each port will accept a 37-pin male connector; the ports are labeled from left to right as B, C, and A.

Typically, three data cables are already attached to the switchbox when the system is delivered. Connecting the other end of each cable is the only

action necessary. However, for clarity, each cable and its connection is described in the following paragraphs:

- Cable 1 connects the switchbox to the Klashopper card cables (Figure 20). Cable 1 contains a 37-pin male connector and 25-pin male connector. The 37-pin male connector plugs directly into Port A on the rear of the switchbox. The 25-pin male connector plugs into the line converter, which connects to the Klashopper card through the use of gender changers and additional cabling.
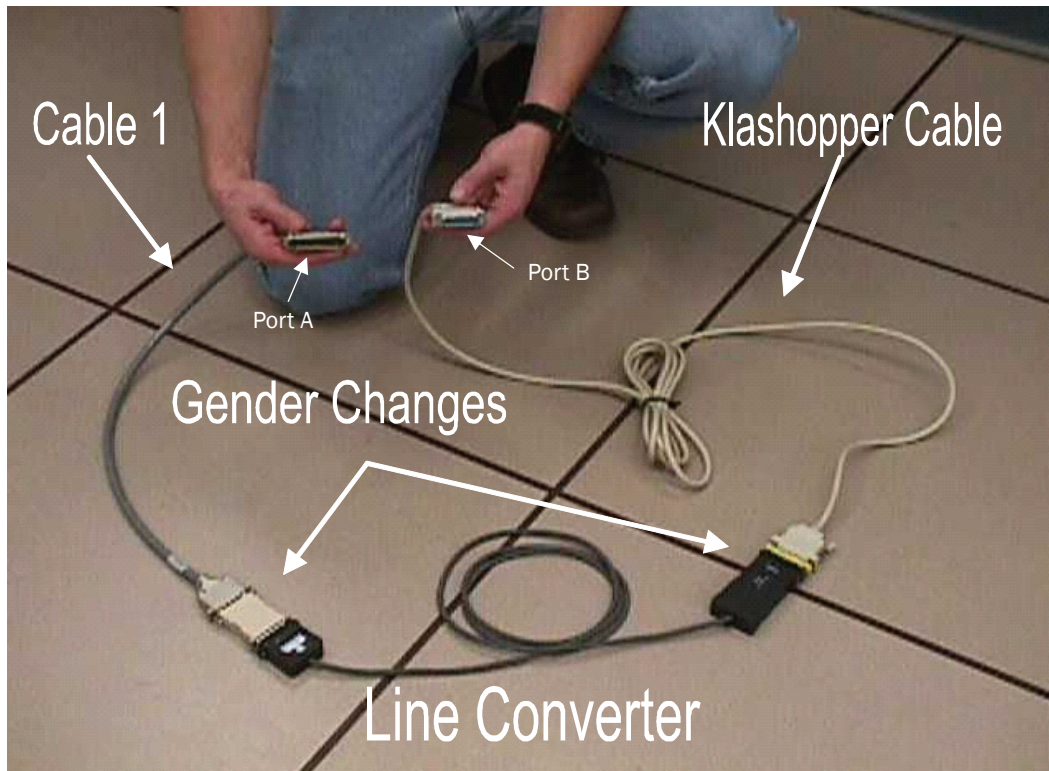
Figure 20. Cable 1 and Klashopper card cables.

- Cable 2 consists of a 25-pin male connector and 37-pin male connector (Figure 21). The 37-pin male connector plugs directly into Port B on the rear of the switchbox. The other cable end, a 25-pin male connector, plugs directly into the VS_x 7000e interface box. The box contains two ports; always use Port 1. The opposite end of the interface box has already been connected to the VS_x 7000e in earlier steps of this setup.
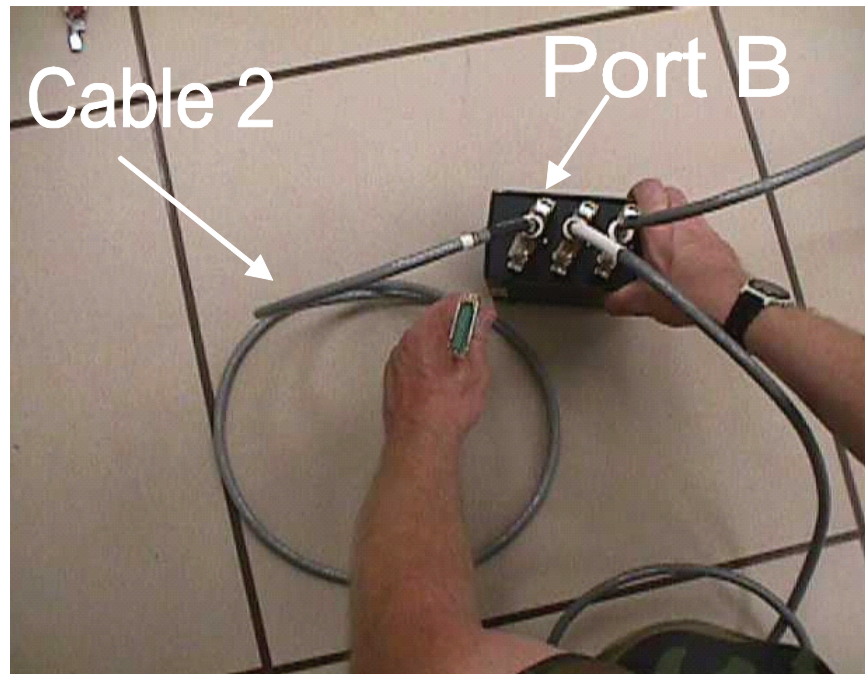
Figure 21. Cable 2.

- Cable 3 contains a 37-pin male connector on each end (Figure 22). One 37-pin male connector plugs directly into Port C on the rear of the switchbox; the other end, a 37-pin male connector, connects directly into the KIV Red Port located on the rear of the KIV. NOTE: Always handle the KIV by the sides to avoid accidental "zeroizing."
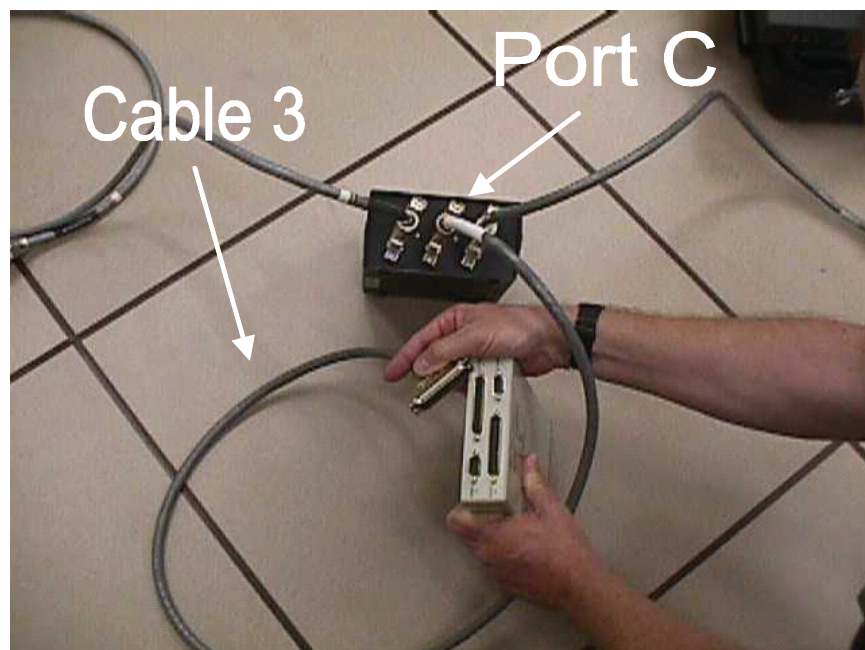
Figure 22. Cable 3.

- Cable 4 contains a 25-pin male connector and 37-pin female connector (Figure 23). The 37-pin female connector plugs directly into the KIV Black Port on the rear of the KIV. The 25-pin male connector plugs directly into the rear port of the ADTRAN into port DTE #2. Using a screwdriver, secure all cables.
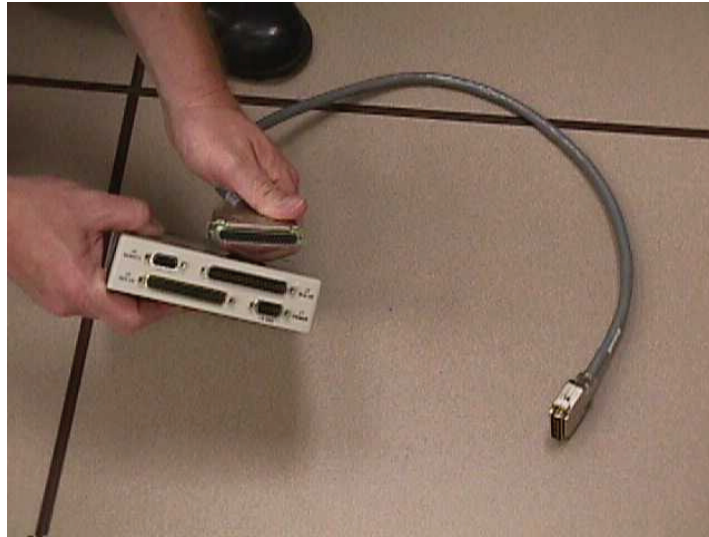
Figure 23. Cable 4.

Refer to Figure 1 for an illustration of the final setup of the TCE-F.

4   Operation of the System

The following two sections provide instructions on the operation of the TCE-F.

Conducting a VTC

To initiate a secure VTC, ensure the switchbox selector knob is positioned to VTC or "B." Power the VS_x 7000e by positioning the rocker switch on the right rear side (looking from the rear) of the VS_x 7000e to the "1" position. An LED on the front right of the VS_x 7000e indicates the power status. If the LED is purple, the system is powered-off; green or amber indicates the unit is "on." Remember, a few minutes are required to boot the VS_x 7000e. Turn on the TV and ensure the channel (input) selection mode is "INPUT." A start screen similar to the one in Figure 24 should appear on the TV.

Figure 24. Start screen.

Various functions of the TV and VS_x 7000e can be controlled with the remote control (Figure 25).
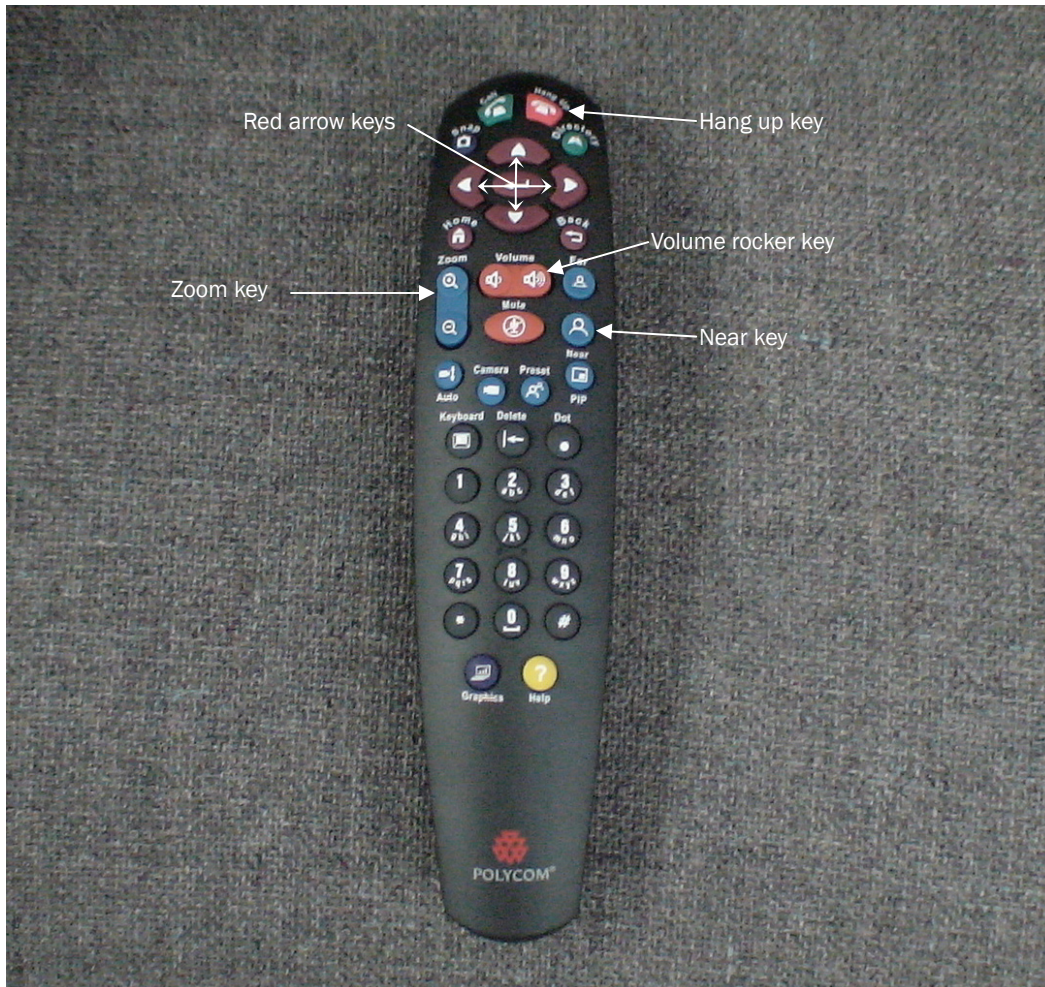
Figure 25. VS\ :sub:`x` 7000e remote control.

Some of the more commonly used keys on the remote control are these (moving clockwise in Figure 25):

- *Zoom key*. Located on the left side; used to "zoom" the VS$_x$ 7000e camera.
- *Red arrow keys*. Located near the top of the remote control after a full screen has been activated, these keys can be used to rotate (pan/tilt) the VS$_x$ 7000e camera to obtain a desired view.
- *Hang up key*. This key does not disconnect your call. Disconnecting your call is facilitated through the ADTRAN by depressing #, enter, enter.
- *Volume rocker key*. Located on the upper mid-center of remote, increases or decreases the audio output of the VS$_x$ 7000e.
- *Near key*. Located on center right side of remote above the word "Near." Pressing this key results in your camera view going to full screen, which allows a view of what the other participants will see.

Ensure that the KIV is connected properly. Supplied with each KIV is a crypto ignition key (CIK) that will activate that unit, only. Figure 26 provides an illustration of a CIK.

Figure 26. Crypto ignition key (CIK).

Turn on the ADTRAN; the display should indicate a ready message, depending on your nationality of service.

Insert the CIK into the slot located on the right front side of the KIV and turn the CIK clockwise one-quarter turn to the horizontal position, as shown in Figure 27.

Figure 27. KIV with CIK inserted and turned to horizontal position.

The KIV will "beep," and a series of messages will appear on the KIV display: "Testing," "Batt Good," "Key Good" and, finally, "FDX." After the FDX message appears and remains in the FDX mode, the Online button will flash, indicating the system is ready for a secure call. If the call is nonsecure, the KIV must be completely removed from the system by unplugging the two cables connected to the RED and BLACK ports of the KIV, and plugging the two cables together.

On the ADTRAN front panel, press "#" to display the dialing screen. If DTE#1 is flashing, use the "up" arrow to select DTE#2. (Note: These instructions assume that DTE#2 is in use, as directed in Chapter 3. If the KIV cable is connected to DTE#1, then DTE#1 should be selected.) Once DTE#2 is flashing, press Enter. Press "2," then press Enter to bring up the display, which reads "Dial Number." Enter the ISDN number; for example, to connect to the TEOC bridge from within the U.S., enter "16015555555" [1] and press Enter. Based on the ADTRAN type, the display will read "Dialing," "Connecting," "Bonding Setup," followed by "Bonding 128K." (When connecting to a deployable system, the display will read "Clear Channel.")

When the display reads "Bonding 128K" (or "Clear Channel," if connecting to a deployable system), the ADTRAN's TD and RD lights should both be flashing. The KIV will beep twice, and the Online light will turn solid. The display will read "FDX TR." The VTC will finalize its connection.

To terminate communications, press the "#" key to bring up the dialing screen. Ensure DTE#2 is flashing, and then press Enter. Press Enter again to "hang up" call. The display will present a ready message.

Always ensure the microphone is muted when you are not speaking. A red light on the microphone button indicates that it is muted.

Transferring data

The following paragraphs provide instructions on transferring and receiving files to/from other sites.

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[1] The "16015555555" is simply an example; this number is an invalid number. Exact numbers and dialing sequence may vary depending on your site and the dial-in number assigned by the TEOC. Depending on your commercial service configuration, you may need to enter a "9," "7," "1," "9-1," etc., preceding your assigned dial-in number.

Ensure the ADTRAN is turned "on." The display should present either a ready message or "Deactivated." Ensure the appropriate hard drive is installed in the TCE-F. If classified material will be exchanged, ensure the secure hard drive is installed. The computer must be disconnected from all other networks. The hard drive may be interchanged by simply removing (unlock with key and pull out) and inserting the other drive (push in and lock with key). Hard drives may be swapped only when the computer is "off."

Ensure the switchbox is set to "DATA" or "A." For secure communications up to the SECRET level, insert the CIK into the KIV and turn clockwise one-quarter turn until the unit powers up. The display should read "FDX," and the Online indicator should be flashing.

For nonsecure communications, the KIV is not needed. Simply remove the two 37-pin connectors attached to the rear of the KIV and plug them together.

A TCE-F may dial another TCE-F to perform a data transfer. To accept a call from another TCE-F or a TCE-D, the Peer-2-Peer software must be in the "listening" mode. The following steps describe how to dial the TEOC TCE-F for data transfers.

- On the PC's desktop, double-click on the KlasPeer2Peer icon to start the software. See Figure 28 for an illustration of the icon.

Figure 28. KlasPeer2Peer icon.

- Double click on the TEOC connection configured on the system (Figure 29). (Connections to other TCE-Fs can be provided. Contact the TEOC for setup.)
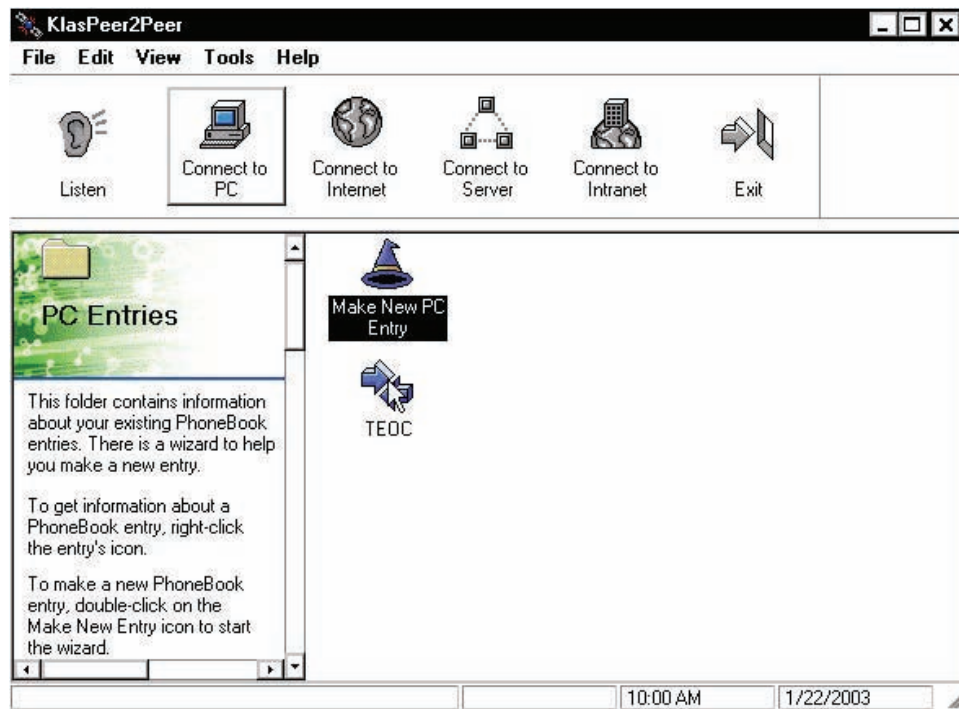
Figure 29. TEOC connection icon.

- In the "Connect TEOC" window, enter your username and password. (See Figure 30.)
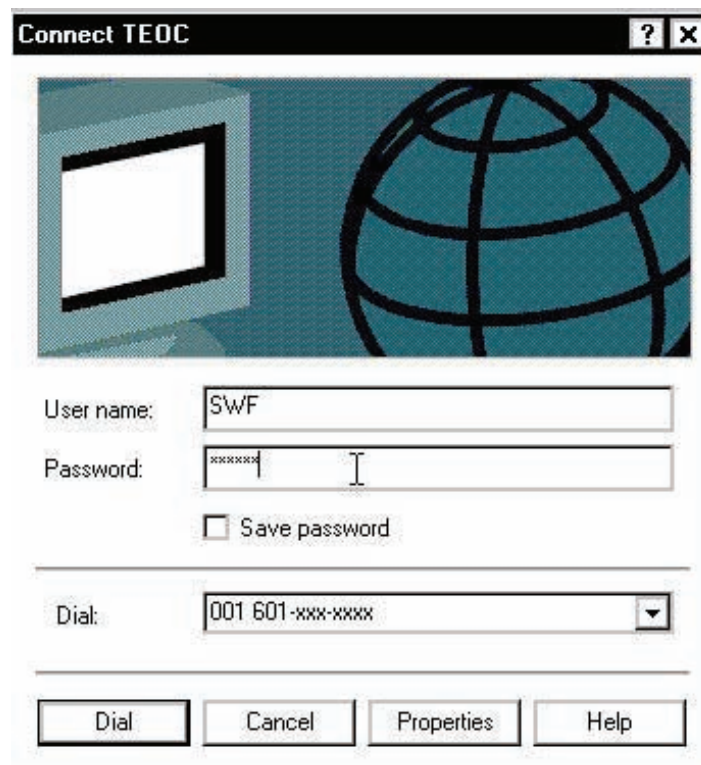
Figure 30. Entering User Name and Password

- Dial the number to the TEOC TCE-F on the ADTRAN with these steps:
  - o Press #, ensure DTE#1 is flashing (selected), and press Enter.
  - o Select 2 (Dial Number) and press Enter.
  - o Enter the 10-digit number provided by the TEOC, preceded by the number(s) required to dial from your specific site. For example, depending on your commercial service configuration, you may need to precede the number with a "7," "9," "1," "9-1," etc.
  - o When the ADTRAN displays Bonding 128K, press the Dial button on the "Connect TEOC" window. (See Figure 31.) The system will verify your user name and password.
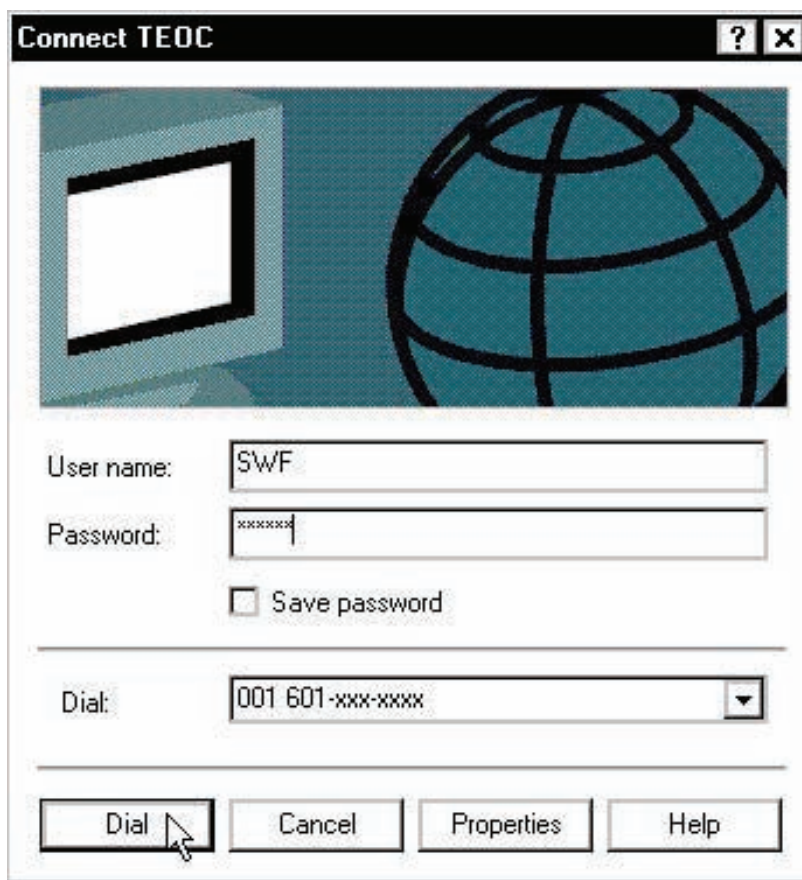
Figure 31. Pressing Dial on the Connect TEOC window.

- If the connection is successful, an information screen will appear, informing you of the IP addresses for your machine and the far machine. Click OK. (See Figure 32.)
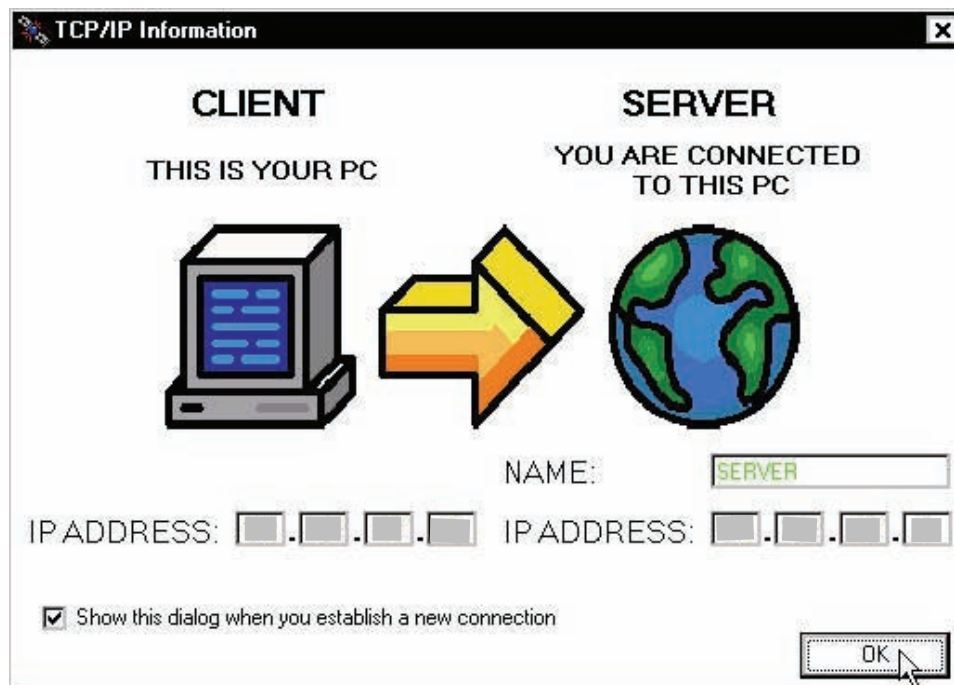
Figure 32. TCP/IP Information window.

- On the next screen, double click on the File Transfer icon. The icon is illustrated in Figure 33.
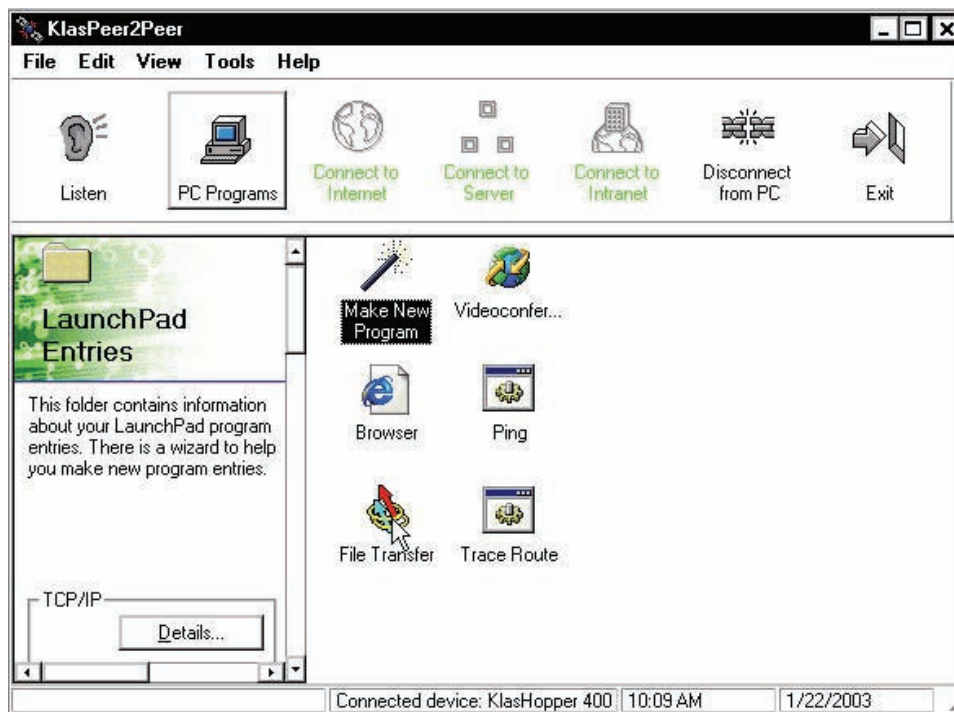
Figure 33. Selecting File Transfer icon.

- Select SERVER from the WS_FTP Sites window (Figure 34).
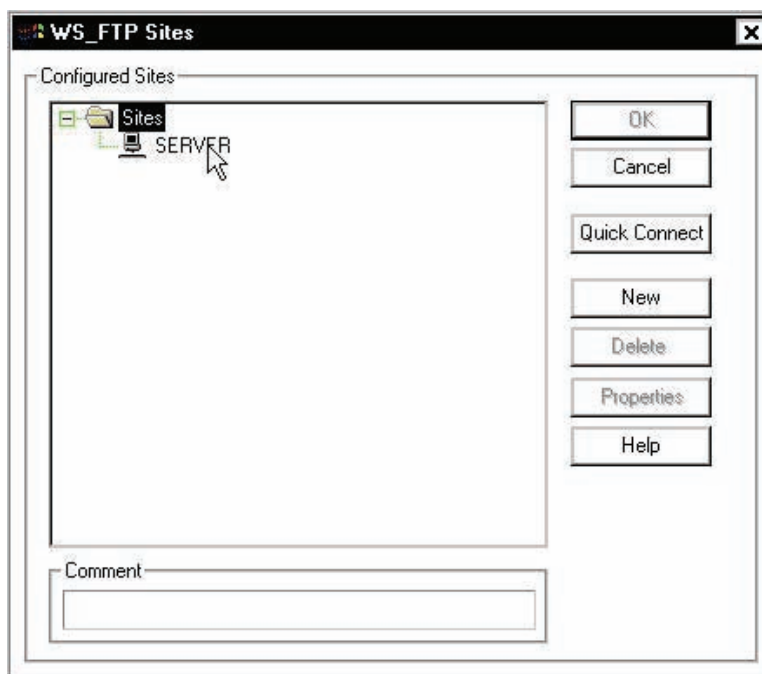
Figure 34. Selecting the TEOC server site from the WS_FTP sites list.

- A WS_FTP window will appear, showing a folder and its contents for your PC (Local System) and for the TEOC TCE-F (Remote Site). Freely change folders as desired and move files between the two machines by highlighting the file(s) of choice and using arrow buttons in the center of the screen to define the "direction" of the transfer and to initiate the transfer as shown in Figure 35.
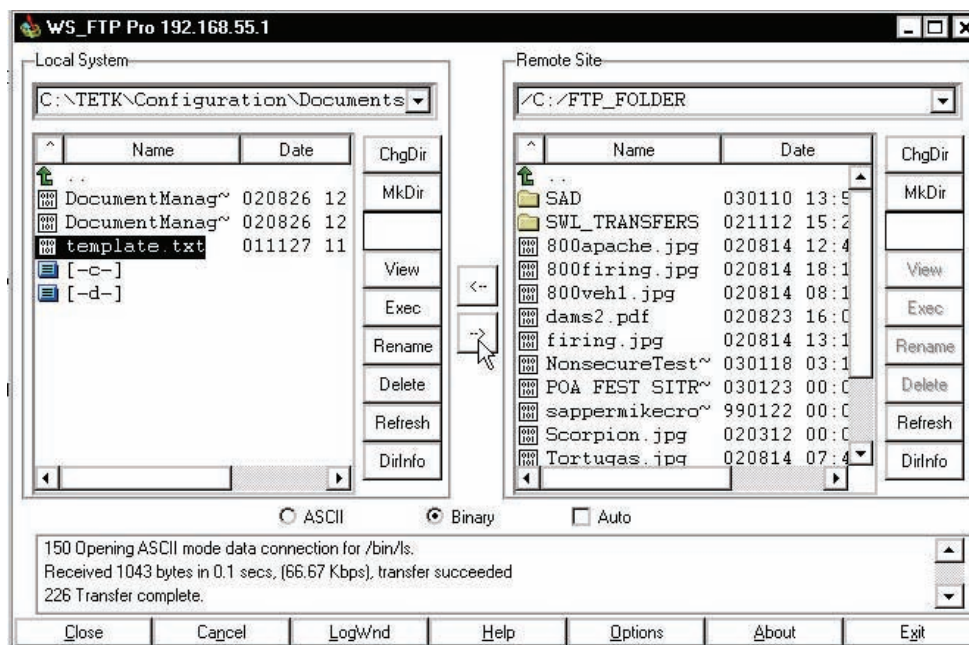
Figure 35. WS_FTP window for moving files.

- When finished, exit all software, and hang up the ADTRAN by pressing #, Enter, Enter.

5   Getting Technical Support

If you need technical support, contact the TEOC at one of the following numbers:

- (601) 634-3485 (Commercial)
- (312) 446-3485 (DSN)

TEOC personnel respond to the voice mail associated with these numbers 24 hr a day, 7 days a week for urgent requests. Every reasonable effort will be made to assist you.

Questions and requests to schedule VTCs may be emailed to the TEOC at

- teoc-vtc@usace.army.mil (nonsecure)
- teoc@teleengineering.army.smil.mil (secure-SIPRNET)

You may visit our Web sites at

- https://teleengineering.usace.army.mil (nonsecure)
- http://www.teleengineering.army.smil.mil (secure)

Appendix A: VS$_X$ 7000e Ports Identification

1. Video input 1 for VCR/DVD or 3rd video source (people or content)
2. Video input 2 for main camera (people)
3. Video input 3 for 2nd video source (people or content)
4. Video input 4 for VGA-SXGA (content sharing) – optional
5. Video output 1 for VCR/DVD record
6. Video output 2 for main monitor
7. Video output 3 for 2nd monitor
8. Video output 4 for VGA/XGA main or 2nd monitor
9. Audio input 1 for stereo line level
10. Audio input 2 for stereo VCR/DVD
11. Audio input 3 for C-link, support up to 3 devices for stereo audio
12. Audio input 4 for POTS
13. Audio output 1 for stereo VCR/DVD
14. Audio output 2 for stereo line level
15. H.320 network interface bay
16. IR Control, power for main camera
17. RS-232 #1
18. RS-232 #2
19. LAN NIC, 10/100 auto sensing
20. EIA electrical input

Appendix B: Troubleshooting Tips

Symptom	Fix/Cause/Action
ADTRAN displays "Link Down"	Possible Causes: ISDN cable is not connected to the ADTRAN or is faulty. Ensure the cable is connected.
ADTRAN's display is blank	Possible Causes: ADTRAN is "off." Turn on ADTRAN power switch on rear of ADTRAN.
KIV displays "Need key"	KIV has no key (fill material) installed and/or the KIV has been zeroized or the wrong key location (x01, x02, etc.) is selected. Coordinate with TEOC and/or COMSEC custodian to reload key.
KIV displays "Zeroized"	KIV has no key (fill material) installed and/or the KIV has been zeroized. Coordinate with TEOC and/or COMSEC custodian to reload key.
KIV says "Invalid CIK"	Possible causes: CIK is damaged and/or demagnetized. Try to reload key (fill material). You have inserted wrong CIK. Ensure you have correct CIK that is associated with your KIV.
KIV shows error message (ERROR 98, ERROR 99, etc.)	Turn off CIK and turn on again. If this does not resolve the problem, simultaneously depress the scroll-up and scroll-down buttons while powering-up KIV; continue to depress the buttons until the KIV display reads "INIT EEPROM." If this resolves the problem, you will need to set up the KIV and reload keys. Contact the TEOC for details.
KIV's display is blank	1. Ensure Power and cables are connected to KIV. 2. Ensure Power to gray case is on. 3. Turn on CIK.
KIV shows FDX, but not FDX TR; ADTRAN shows TD and RD lights	Try one: Take off-line/on-line (Press ONLINE button twice). Press the Initiate button on the KIV. Reboot Polycom by turning off/on Polycom power switch. Ensure the three KIV cables are connected firmly. Ensure no cable pins are bent or depressed (damaged) on the KIV data cables (two large cables). Is VTC/Data knob turned to "VTC"? Ensure cables on back of Polycom are firmly connected.
Microphone doesn't work	Ensure both ends of cable are connected. Mute/unmute microphone.
Receiving no audio	Check audio volume on TV and Polycom. Check to see if audio cables on back of Polycom and TV are connected.
ADTRAN displays "Bonding 128K," KIV's synchronize displaying "FDX TR," but VTC doesn't establish	Reboot Polycom. You may have a key mismatch. Ensure your key (fill material) is up-to-date. Contact the TEOC. **or** Press the Initiate button on the KIV. Press the ONLINE button on the KIV twice, taking the KIV off-line and then on-line.

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

In fiscal year 1997, the U.S. Army Engineer Research and Development Center initiated a technology demonstration program to determine the feasibility of providing deployed troops with direct access to subject matter experts (SME). Direct access to the SME allows responses to engineering challenges beyond the in-theater capability to be provided without the time delays and costs associated with deploying the SME to the theater.

The purpose of this report is to describe the various components of the fixed-site TeleEngineering communications system and to provide the step-by step procedures required to set up and operate the system. Chapter 2 describes the system components. Chapter 3 provides details on setting up the equipment and the interconnections between the individual components. The operation of the system (i.e., conducting a video teleconference and transferring data) is detailed in Chapter 4, and methods of receiving technical support are discussed in Chapter 5. Appendix A provides a wiring diagram for the fixed-site system; Appendix B summarizes troubleshooting tips.

15. SUBJECT TERMS	Communications Fixed-site	ISDN KIV Reachback	Secure TCE-F TeleEngineering	VTC

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